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[54] COMMUNICATION SYSTEM

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Related U.S. Application Data

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[51] Int. CL⁶ H04N 5/91; H04N 5/38

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[56] References Cited

U.S. PATENT DOCUMENTS

5,087,975	2/1992	Cita et al.	
5,282,019	1/1994	Basile et al.	
5,291,289	3/1994	Hulyalkar et al.	348/273

FOREIGN PATENT DOCUMENTS

0485105	5/1992	European Pat. Off.	
0485108	5/1992	European Pat. Off.	
0506400	9/1992	European Pat. Off.	
0540231	5/1993	European Pat. Off.	

OTHER PUBLICATIONS

4th International Workshop on HDTV, Sep. 1991, Torino, IT; Elsevier 1992; pp. 61-69, Uz et al.: "Multiresolution Source and Channel Coding for Digital Broadcast of HDTV".

SMPTE Journal, vol. 101, No. 8, Aug. 1992, Scarsdale, NY US; pp. 538-549, Schreiber "Spread-Spectrum Television Broadcasting".

Signal Processing: Image Communication, vol. 4, Aug. 1992, Amsterdam, NL; pp. 283-292, Uz et al.: "Combined Multiresolution Source Coding and Modulation for Digital Broadcast of HDTV".

(List continued on next page.)

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[57] ABSTRACT

At the transmitter side, carrier waves are modulated according to an input signal for producing relevant signal points in a signal space diagram. The input signal is divided into, two, first and second, data streams. The signal points are divided into signal point groups to which data of the first data stream are assigned. Also, data of the second data stream are assigned to the signal points of each signal point group. A difference in the transmission error rate between first and second data streams is developed by shifting the signal points to other positions in the space diagram expressed at least in the polar coordinate system. At the receiver side, the first and/or second data streams can be reconstructed from a received signal. In TV broadcast service, a TV signal is divided by a transmitter into, low and high, frequency band components which are designated as a first and a second data streams respectively. Upon receiving the TV signal, a receiver can reproduce only the low frequency band component or both the low and high frequency band components, depending on its capability. Furthermore, a communication system based on an OFDM system is utilized for data transmission of a plurality of subchannels, wherein the subchannels are differentiated by changing the length of a guard time slot or a carrier wave interval of a symbol transmission time slot, or changing the transmission electric power of the carrier.

5 Claims, 174 Drawing Sheets

